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PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

SESSION 1858-9.

Fourth Meeting, January 10th, 1859.

SIR RODERICK I. MURCHISON, PRESIDENT, in the Chair.

PRESENTATIONS.—*Francis Lyne and Charles Lewell, Esqrs., were presented upon their election.*

ELECTIONS.—*Rev. William G. Clarke, M.A.; Commander R. Boynton Creyke, R.N.; Lieut. Henry Lamb, I.N.; Sir H. Pollard Willoughby, Bart., M.P.; Thomas H. Alsager, B.A.; and Edward H. Bramah, James Brand, William Brown, F. Solly Gosling, Valentine Labrow, Donald Larnach, Patrick Leslie, W. Drury Lowe, John Miland, Marc H. Pasteur, and Charles Ratcliffe, Esqrs., were elected Fellows.*

EXHIBITIONS.—Photographic and other views of the Termini and the proposed Route for the Honduras Inter-Oceanic Railway; and specimens of silver and copper ore, &c., brought from Mexico by Charles Sevin, Esq., F.R.G.S., were exhibited to the meeting.

The Papers read were:—

1. *Notes on the Zambesi Expedition.* From the Journal of THOMAS BAINES, Esq., F.R.G.S., Artist to the Expedition.

Communicated by Dr. LIVINGSTONE, F.R.G.S.

With Maps by Mr. SKENE, R.N., and Mr. THORNTON.

The PRESIDENT read portions of a letter from Dr. Livingstone, in which he described how he had navigated the lower portion of the Zambesi, the good quality of the coal which had been obtained on its banks, the affectionate reception he had met with from his old native adherents, the cordial assistance of the Portuguese authorities, and the steady and vigorous support of the different officers of his Expedition, specially mentioning Mr. Thornton for having constructed a good chart of a portion of the river.

He also noted a peculiarity in this river, that where the ripple on the surface was most intense, there the water was deepest.

MR. BAINES's journal extends from June 25 to September 17, 1858, and the following is a short abstract of its contents:—*June 25.* The last of the luggage was taken from the *Pearl*, put into the launch, and the iron house on Expedition Island, lat. $18^{\circ} 24'$, was partly set up. The launch was overhauled and examined, deck-house caulked, &c.—*June 30.* Dr. Livingstone left in the launch for Tete or Senna, and the parties left behind were Dr. Kirk, Mr. Livingstone, three Kroomen, and a dog (besides Mr. Baines).

July 3. Troubles with the rain; the house leaks. The wind has been usually south-south-east, and strong.—*July 4.* River falls about $1\frac{1}{2}$ inch per diem, and is 8 feet below its highest level.—*July 5.* Two canoes passed the island, going seaward, carrying rice and Kaffir corn, a native, speaking Portuguese, with a gun, bows 4 feet long, reed arrows, iron-headed and stout spears.—*July 6.* Another canoe with five or six natives, bringing plantains, eggs, and firewood for sale. Cloth is the medium of exchange; a tedious bargaining is necessary.—*July 7.* Photography begun. Sudden sickness of Messrs. Baines and Livingstone; the two canoes returned, and some alligator flesh was bought from them. The alligators are shy, so are the hippopotami.—*July 19.* Launch returned; Dr. L. had to stop five miles short of Senna, owing to the shallowness of the river, where the stores were landed. The authorities were disposed to be friendly. Mr. Baines is to accompany the launch up in her next trip.—*July 20.* Completed the reloading of the launch, 1600 lbs. of beads, &c., and set off in her. The river was broad, but the channel narrow, tortuous, and shooting from side to side. The more exposed parts of the banks of the islands are cut away by the stream at the rate of several feet per diem. Several alligators and hippopotami were fired at; none killed. Dr. Livingstone mentions that he had never seen an hippopotamus on land till within the last few days.—*July 21.* River broad and shallow; sounded with the whale-boat ahead, and got safely through the shallows; further difficulties.—*July 22.* Thick fog in the morning; reached the mouth of the Mutu, the river formerly laid down on the maps as the main branch of the Zambesi. It was a gully 10 feet wide and 4 feet deep, and its bottom was actually 9 or 10 feet above the surface of the water in the Zambesi. An old capsized canoe lay high and dry in it, where it must wait till next rainy season. The village of Mazaro is close by. The head-quarters of the Portuguese army are here now; two mutilated corpses were passed, and there was an attack from some rebel Landeens while the launch was there. The Portuguese Governor was sick, and given a passage in the launch to Cipanga, which was reached in the afternoon. Some large

canoes, 30 feet long, 4 deep and 4 wide, were being neatly made out of single trees; their cost is estimated at 50*l.* each. Latitude about 18° 1'.—*July 23.* Bought some fowls at Cipanga, and went on in the evening.—*24th.* Numberless small islands; used sails almost for the first time.—*25th.* Came to difficulty in the river, and grounded.—*26th.* Explored for a channel in the whale-boat, and had a great deal of wading. The native pilot was completely at fault. In evening, came in full sight of the double hill of Senna. The launch anchored, as before, some miles short of the town, and the party went on to it at night, for the first part of the way in the whale-boat, and for the last seven miles on foot.—*27th.* The view from Senna of the river and distant hills was fine. Some of the Landeens, allies of the Portuguese, were in the town and danced war-dances. There is a large stockade of green trees, lately planted, that have taken root; 500 people, come from a distance, are living in it for protection.—*28th.* Visited the store-house. The launch got up to within two miles of Senna. There was some difficulty in landing a saw-mill that had been brought in the vessel; the natives had no idea of pulling together.—*29th.* Returned in the launch and grounded; at last got near to Cipanga. The Portuguese and the rebels were encamped face to face on opposite sides of the river. Met a black man who spoke some English.—*31st.* Reached Expedition Island. Captain Bedingfeld, who had previously resigned, but had volunteered to continue his services as long as needful, is now relieved from the command of the launch.

Aug. 1st. Kirk joins the launch, and Baines remains on the island, where he is to make magnetic observations, &c.—*2nd.* The launch is reloaded, and starts under the command of Dr. Livingstone; his brother is left in command of the island.—*3rd, 4th, and 5th.* Worked at taking down the iron house.—*6th.* The launch returned with news of a Portuguese brig having arrived at Quillimane.—*7th.* (Mr. Baines) very unwell and weak. Some canoes of runaway natives came to the island. A heavy squall of rain.—*8th.* Ill.—*9th.* The launch (including Baines) started up the river.—*10th.* Still ill.—*11th.* Ditto. Landed at Cipanga; much warlike bustle and some war-dancing. The stores were landed; (Baines and) Kirk were left, and the launch returned to Expedition Island.—*14th.* Conversed with some Zulus who had fled in former times from Inhambane through fear of Dingaan, and now fought in the service of the Portuguese. The cause of all this war is not very intelligible. Dr. Livingstone offered to mediate, but the Governor did not desire it.—*15th.* The people of Cipanga are abominably filthy in their habits.—*16th.* The launch arrived with the remainder of the stores. Cap-

tain Bedingfeld was left with Colonel Nunes for a passage to Quillimane; Kirk and Thornton remained in charge of the stores, and Baines goes up river. Rae, the engineer, is sick with excessive work, and Mr. Livingstone tends the engine.—17th. Reached Shamoeira. Several slaves were on sale for a fathom of cloth each.—18th. An accident with the whale boat: she fouled the paddle-wheels and capsized; more than one man was nearly drowned. Several stores were lost; part of the sugar-mill, some boiler tubes, spades, &c., but the boat itself was not hurt.—19th. Further troubles in navigating the shallows.—21st. Dr. Livingstone and his brother landed and walked to Senna.—22nd. Began settling with the natives who had worked at landing the stores; they asked 100 fathoms of cloth. The price of the country is one yard of cloth for carrying a man's load one league. The 100 fathoms was a great overcharge. The decision of the matter was deferred. Left Senna and steamed up the river. The islands were numerous and the vegetation became richer.—23rd. Made only about seven miles.—24th. Channel very intricate; the pinnace drew too much water. The loads were so adjusted that both launch and pinnace drew 2 feet 4 inches.—25th. Launch grounded, and was in serious danger. It was arranged that Baines should remain behind in the pinnace with one whale-boat and two Kroomen, and that Dr. Livingstone should go with the launch and one whale-boat only to Tete. The entire flotilla was too much for the launch to tow.—26th. The launch was detained for want of some slight repairs.—27th. Launch started. Baines rigged up an awning to the pinnace; the natives brought food to sell. There was a good deal of planted ground in the neighbourhood. Many hippopotamus spears were observed in the village.—28th. Arranged a cooking-place on board the pinnace.—29th. Natives rather troublesome; their canoes surrounded the pinnace: observed latitude $17^{\circ} 9' 30''$.—30th. Moved the pinnace to mid-stream and anchored there.

Sept. 2nd. Made a tiller to the whale-boat; shifted anchorage about a mile.—4th. The grass was burning on the hills, and burnt leaves, &c., carried upwards by the stream of rarefied air, fell about the boat.—5th. Three canoes passed by.—6th. Sailed a little farther, but the boat was so heavily laden as hardly to be manageable by the small crew in this strong current and intricate river except straight before the wind. The days passed with no particular incident till, on the 17th, the launch returned. It had been only three days returning from Tete. Mr. Livingstone was left at Tete. He and Mr. Rae had both been very ill. Some coal was brought on board.

The PRESIDENT, after returning thanks to Dr. Livingstone, and to MM. Baines and Thornton, and expressing the gratification which all must feel to hear that their valued friend, Dr. Livingstone, had been so well supported, invited remarks upon the subject before the meeting, and suggested that Mr. M'Gregor Laird, the ingenious designer of the little steamer, the *Ma Robert*, might wish to say something upon the statements made regarding the performances of that vessel.

MR. LAIRD, F.R.G.S., said that the steamer had been overloaded. It was designed to draw only 16 inches of water, and not 2 feet 6 inches. It was never intended to carry more than one or two days' coals. When she was first tried Dr. Livingstone had written to his (Mr. Laird's) brother in very congratulatory terms of her success. In the account given of the Zambesi it was interesting to observe the difference between it and the great river of Western Africa. The great width of the channels of the Leambiye, in the Delta, was very remarkable. The difficulty of navigating where it is broad and smooth was easy to understand, because the same body of water in a small narrow channel would be much deeper. What had particularly struck him in Dr. Livingstone's letter and in the journal of Mr. Baines was, that whereas in the Niger, up to the head of the delta, the whole width of the river, and the channels by which it is approached, does not exceed four hundred yards within a hundred miles of the sea, this other great river seemed to have a breadth of three miles. That was a characteristic of the Zambesi, and he thought would prove to be a serious disadvantage. He was afraid from that, and from the fact of the rapids occurring at such a short distance from the sea, that they could not with much confidence look forward to the time when the Zambesi would become a great channel of commercial enterprise. He hoped he might be mistaken in his judgment, but should be sorry to encourage expectations which he thought there were many reasons for believing would not be realized. However, it was very satisfactory to learn that Dr. Livingstone, whom they all so much admired and so deservedly esteemed, and his party continued, by the help of Providence, to enjoy such excellent health.

MR. LYONS M'LEOD, late Consul at Mozambique, said that he differed in opinion from Mr. M'Gregor Laird with regard to the navigableness of the river Zambesi, and its importance for commercial purposes. From information he had received from the Governor of Tete, and from a Portuguese who had been up and down it a number of times, he concluded the Zambesi to be navigable for at least eight months out of the twelve, for vessels drawing from four to six feet of water. It was well known that many of the rivers in America had steamers upon them with not half that draught of water. And it was a most important fact, and full of promise, that the banks of the Zambesi, from the Luavo mouths up to Senna, and even nearly up to Tete, were covered with very valuable timber fit for ship-building—a fact specially interesting to think of at a time when we were looking to every part of the world for timber for ship-building. A quantity of the timber of the Zambesi was from forty to sixty feet in length, and from three to six feet in the square. Some of these trees, from growing forked, would be peculiarly fitted for the futtocks and knees in ship-building. There were some beautiful woods also for furniture purposes; the roots as well as the trunks could be manufactured into handsome and useful articles. There were also dye woods used by the natives for colouring cotton, silk, and wool; and there was one tree which afforded a bark called in commerce *cinchona* bark; and, from the tree, as well as from the bark, quinine could be extracted, and the timber was adapted for the masts of ships. He had brought home with him from Mozambique some twenty-six specimens of the woods, which were now in the rooms of the Society at Whitehall-place, and might be seen by all who took an interest in the subject. He

had also brought home specimens of the cotton described by Dr. Livingstone, which had the appearance of wool; and he had specimens, moreover, of cotton growing on the main land, opposite to the island of Mozambique. Oil, ivory, minerals, hides, as well as cotton, and other useful products, were to be had in abundance. Wheat could also be grown, and he was of opinion that Tete might become the granary of Southern Africa. England had always at the Cape a considerable body of troops, and it was very necessary that they should have a place whence the Cape could be kept supplied with wheat. In the rear of the town of Tete there was a mountain called the Caruera, from three to five thousand feet in height; here the natives have their plantations of wheat, corn, potatoes, &c., and also round about the town, over an extent of ten miles; so that in the event of the crops in the lowlands being destroyed by an inundation, they have a reserve in the mountain; and should the mountain crops suffer for want of rain, they are amply supplied by their plantations in the lowlands. He had no doubt that wheat could be grown there in sufficient quantity to supply the whole of Southern Africa at a cost of not more than 6s. a quarter. The subject of the navigation of the Zambesi had only to be taken up by mercantile men in order to the opening up of the whole interior of Africa. The whole east coast of Africa was extraordinary for its valuable productions; and in addition to its other commercial features might be mentioned the existence of a large number of deserted mines; unworked, simply because the Portuguese officials did not find it to their interest to open up the country and show it to foreigners; because, if they did so, the slave-trade would inevitably be suppressed. People now make their money and go away; and if legitimate commerce were entered into, the occupation of the slave dealer would be gone. The opening up of Eastern Africa would, without doubt, be a mine of wealth to this country.

MR. J. CRAWFURD, F.R.G.S., had not intended to say a word upon this subject, but could not refrain from so doing after what had fallen from Mr. M'Leod. He was glad that Dr. Livingstone had said nothing whatever on, or had held out no promising expectations of trade, great or small, with the east coast of Africa, or the Zambesi river; and it appeared to him (Mr. Crawford) that there was no prospect of any such trade as that spoken of by Mr. M'Leod. He agreed entirely with Mr. M'Gregor Laird in thinking that the Zambesi river was a bad one, and totally unfit for the navigation of vessels of any considerable burden. They had now the diary of Mr. Baines, and it was impossible to hear that diary read without coming to the conclusion that the river was crooked and shallow, and extremely difficult of navigation. Mr. M'Leod had mentioned the existence of some valuable timber on the banks of the river, but had not given the meeting the names of any of the valuable trees. The trees might be large and tall, and yet be good for nothing, and he did not believe that there was any timber on the Zambesi fit for the general purposes of ship-building. In fact, in all Europe there was one tree, in America two only, and but one in India, fit for ship-building: what those trees were in Africa fit for ship-building it was difficult to say. At present we had but the teak for India, the oak for England, and the live oak for America. And then it was stated that a large trade in wheat might be carried on, and this even grown, in 17° and 18° s. latitude, and nearly on the level of the sea. Now wheat never grew advantageously in any such latitude, and never would. Then, regarding cotton, African cotton would not suit the manufacturers of Manchester and Glasgow; and those who expected to get a supply of cotton from thence would be wholly disappointed; they would never get it. It was said the native cotton appeared like wool; that was on account of its extreme coarseness, and not on account of its feeling like wool in the hand. The good cotton of Africa appeared to have been imported; it was a foreigner. He had not the least doubt but that cotton would grow in

Southern Africa, but not without the employment of capital, enterprise, and skill; and where were these to come from? England was the only nation, except the United States, that could enter upon such a work, and it was not likely at all events that England would do so, seeing that she had enough territory on her hands already, equally or better fitted.

MR. M'QUEEN, F.R.G.S., said that with reference to the existence of coal at Tete, that was not a discovery now made for the first time; for twenty-five years ago they were tried at Lisbon, and also at Goa and Mozambique, on board, he believed, the *Nemesis*, and found perfectly good. Then with reference to wheat growing at Tete, he could tell Mr. Crawford that it does grow there. It was said that it could not grow there, because wheat did not grow so near the equator: now the finest wheat in the world was produced on the river Webbe, near Brava, close to the equator, and might be bought cheap, and in any quantity. As to cotton in Africa, it had been known for three thousand years, and very fine cotton too; and it was well known that in the interior the people had for ages manufactured their garments called Tangas of that cotton, which is very fine and very strong. Regarding the Zambesi he was satisfied there were many serious obstructions in its channel; but with some blasting here and there, and the use of other means, which would doubtless prove laborious, but not impracticable, there would be no place that a vessel fitted for the commerce of the country could not pass. Mr. M'Queen farther called attention to the efforts that are being made by Portugal to strengthen its position in Eastern Africa, and along the valley of the Zambesi. They were establishing custom-houses at the mouth of the river, at Senna, at Tete, and Zumbo, and by a decree in January, 1855, they had defined the meaning of the government of the rivers of Senna to be and to include the whole of the Zambesi from the sea upwards, and specially to include all the ancient province of Zumbo, with the districts of country to the northward, situate on both banks of the river Arroango of the north.

MR. CRAWFORD again rose and said he had never before heard of wheat growing within the tropics, and at the level of the sea. They must come to 26° latitude before they could grow wheat. It would not grow either at Bombay or Madras. He knew that in Java, 6° or 7° south of the equator, it would not grow until you reached the elevation of 4000 or 5000 feet, and he could not believe with Mr. M'Queen in the growth of wheat at the equator and at the level of the sea.

MR. M'QUEEN referred Mr. Crawford for information with regard to wheat-growing countries to what was said upon the subject in Krapf's Journals. He would also find that wheat grows on the banks of the Coanzo, not one hundred feet above the level of the sea. And as to cotton, he could testify, after ransacking almost every part of Africa, that there are few places in which the finest cotton does not grow all over that continent.

COLONEL SYKES, M.P., F.R.G.S., could not suppose that his friend Mr. Crawford was serious in the arguments he had used. For himself he entertained very decided hopes regarding the commerce of the Zambesi. Dr. Livingstone had proposed the employment of engineering skill for the deepening of the shallow parts of the river, and the removing of obstructions by artificial means. It was well known that all large rivers formed deltas and branched into shallow streams as they approached the sea; the natural result of the deposits which accumulate as the water comes from higher lands and runs slower. He did not think there was any obstruction that might not be removed or avoided by means of human ingenuity, such as confining the whole stream to one channel of the delta. Mr. Crawford asked what can be the use of the timber without a botanical name, of which Mr. M'Leod had produced specimens fit for ship-building; but was not that fact sufficient, whatever the name might be? What did it matter, although it might not be a *Tectona grandis*, a *Quercus*, or a *Pinus*,

if the wood were of a quality adapted for ship-building? The argument therefore was good for nothing. And then as to Mr. Crawford's statement that wheat could not be produced on the Zambesi because it would not grow within the tropics; the fact being, that wheat was extensively cultivated in India, except south of 13° N. latitude. The finest wheat in the world might be found growing at the level of the sea, and one of the six species or varieties had long been imported because of its gluten in the preparation of cotton cloths at Manchester. In spite, therefore, of the gloomy prognostications of Mr. Crawford, the public might still live in hopes that East Africa would be opened up to our advantage in a commercial-sense.

The second Paper read was—

2. *Account of the Lake Yojoa or Taulebé, in Honduras, Central America.*

By E. G. SQUIER, Esq., of the United States.

[The paper will be printed in the Journal.]

THE lakes of Central America are among its most interesting features, and, next to its volcanoes, are the most likely to arrest the attention of a traveller. Few of these are more remarkable than Lake Itra, which receives the copious drainage of a great basin, but has no apparent outlet, and Lake Yojoa, a sheet of water 25 miles in length, which has only lately appeared in our maps—a fact sufficient to indicate our very imperfect knowledge of the geography of Honduras. The waters of Yojoa escape by no less than nine subterranean outlets; there is also an open one through which enough water runs to float a canoe when the season is not very dry. The average depth of the lake is from 18 to 24 feet, and its elevation is 2050 feet above the sea-level. It occupies the centre of one of those singular basins, of which Honduras offers many examples, called not inappropriately “bolsones,” or pockets. These are formed by the contortions of the mountains, whose spurs frequently coil round upon themselves, sometimes describing almost complete circles, and enclosing plains or lakes of varying extent and elevation. In these, the waters of the surrounding springs and the surface mountain drainage converge and form the commencement of considerable rivers.

The subterranean outlets of Yojoa traverse the mountain walls of the *bolson* in which it lies, and its waters reappear to light bursting through their opposite sides. They consist of limestone, probably much cracked by volcanic agency, resting upon a sandstone basis, and the subterranean outlets of the lake exactly coincide with the line at which this sandstone stratum is found to crop out.

COLONEL SYKES, M.P., F.R.G.S., said it appeared to him that a company would have a great advantage in working a railway, the whole length of which